Claims

1. Screw actuator, comprising a housing (17), a motor (7), an actuating member (10) and a screw mechanism (5) which provides a linear movement of the actuating member with respect to the housing in response to a rotational movement of the motor (7), which screw mechanism (5) comprises a screw (11), a nut (14) engaging each other by rolling elements (13), one of said screw (11) and nut (14) being rotatably supported with respect to the housing (17), and a reduction gear means (6), characterized in that the nut (14) is fixed with respect to the housing (17), and the screw (11) is rotatably supported with respect to the housing by means of the rolling elements (13).

2. Actuator according to claim 1, wherein the screw (11) is rotationally driven by the reduction gear means (6) through a coupling means (19-22) which allows axial displacements.

3. Actuator according to claim 2, wherein the coupling means comprises a shaft (22) accommodated within a bore (37) in the screw (11), the surface of the shaft (22) and bore having axial grooves (19, 21) which engage each other through balls (20).

4. Actuator according to ~~any of the preceding claims~~ Claim 1, wherein the reduction gear means (6) is contained in a reduction gear module and the screw mechanism (5) is contained in a screw mechanism module.

5. Actuator according to claim 4, wherein the reduction gear means (6) comprises at least two gear reduction steps.

6. Actuator according to claim 6, wherein the reduction gear means comprises gear reduction steps of a different type, such as a planetary gear reduction step (25-28) and a right angle gear reduction step (28-31).

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7. Actuator according to ~~any of the preceding claims~~ Claim 1, wherein the screw (11) engages the actuating member (10) through a bearing (12) capable to carry axial and/or radial load.

8. Actuator according to ~~any of claims 1-6~~ Claim 1, wherein the screw (11) is rigidly connected to the actuating member (10).

9. Actuator according to ~~any of the preceeding claims~~ claim 1, wherein the actuating member is a piston (10), which is slidably held within a cylinder space (38, 59) of the housing (17).

10. Actuator according to claim 7 ~~and 9~~, wherein the piston (10) is held non-rotatably by means of a groove and pin assembly, or by means of a ball/groove assembly.

11. Actuator according to claims 8 ~~and 9~~, wherein the piston (10) is rotatably held within the cylinder space (38).

12. Actuator according to claim 9, wherein the cylinder space (59) is formed in the nut (14).

13. Actuator according to claim 4, wherein the modules are axially aligned.

14. Actuator according to claim 4, wherein the modules are in ~~laterally shifted~~ positions, which are laterally shifted with respect to the axis of the screw mechanism (5).

15. Actuator according to ~~any of the preceding claims~~ claim 1, wherein one or two ~~laterally shifted~~ motors are provided, which are laterally shifted with respect to the axis of the screw mechanism (5).

16. Actuator according ~~any of the preceeding claims 4-15~~ claim 4, wherein the reduction gear means (6) comprises at least part of a planetary gear system having a stationary outer ring gear (27) with inwardly pointing gear teeth.

17. Actuator according to claim 16, wherein the reduction gear means comprises satellite gear wheels (26) which mesh with the ring gear (27) and which are accommodated on a carrier (25) connected to the shaft (22) engaging the screw mechanism (15).

18. Actuator according to claim 17, wherein the sun gear wheel (28) of the reduction gear means (6) is connected to a bevel gear (29) which mates with a motor gear, e.g. an angled or right angled gear transmission (32).

19. Actuator according to claim 18, wherein the sun gear wheel (28) and the bevel gear (29) are carried out as a unitary gear wheel (30) which is supported with respect to the nut (14) of the screw mechanism (5) by means of a rolling element bearing (31).

20. Actuator according to claim 18 ~~or 19~~, wherein the pitch diameter of the bevel gear (29) is larger than the pitch diameter of the sun gear wheel (28).

21. Actuator according to ~~any of the preceding claims~~ claim 1, wherein a sensor (33) is provided for detecting rotational and/or translational movements of the screw mechanism (5).

22. Actuator according to claim 21, wherein control means are provided, said control means having an input for a control signal, e.g. from a brake pedal, and being connected to the sensor (33) for controlling the electric motor (7) on the basis of the control signal and the signal from the sensor (33).

23. Actuator according to claim 22, wherein the control device is arranged for providing a maintenance indication signal.

24. Actuator according to ~~any of the preceding claims~~ claim 1, wherein balls or rollers (13) of the screw mechanism (5) are coated so as to maintain the proper function of the screw (11) under dry-running conditions such as a diamond-like carbon coating.

25. Actuator according to ~~any of the preceding claims~~ claim 1, wherein the motor (7) is an electric motor.

26. Actuator according to ~~any of claims 1-24~~ claim 1, wherein the motor (7) is a hydraulic motor.

27. Actuator according to ~~any of claims 1-24~~ claim 1, wherein the motor (7) is a pneumatic motor.

28. Actuator according to ~~any of the preceding claims~~ claim 1, wherein at least one of the screw, nut, rolling elements and/or reduction gear components is obtained by hard turning.

29. Actuator according to ~~any of the preceding claims~~ claim 1, wherein the screw mechanism comprises rolling balls, and the grooves in the screw and nut are arranged for adapted contact angles in view of improved axial load bearing capacity.

30. Reduction gear module for use in the actuator according to any of claims 2-27.

31. Screw mechanism module for use in the actuator according to any of claims 2-27.

32. Drive module for use in the actuator according to any of claims 2-29.

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~~33~~. Brake calliper for an electrically actuatable disc brake, said calliper comprising an actuator according to ~~any of the preceding claims 1-29~~ claim 1, and a claw piece (1) carrying two opposite brake pads (2, 3), said actuator comprising a screw mechanism (5) the screw (11) of which is rotatably supported with respect to the housing (17) by means of the balls (23) of the screw mechanism (5), a reduction gear means (6) and a motor (7).

AMENDED SHEET

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~~34~~. Continuously variable transmission comprising two pulleys which each have two discs enclosing a V-shaped groove, as well as a belt engaging said grooves, the discs of each pulley being movable towards and away from each other so as to continually change the running radius of the belt, wherein the discs of each pulley are displaceable by means of an actuator according to ~~any of claims 1-29~~ claim 1.

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~~35~~. Continuously variable transmission according to claim ~~34~~, wherein the drive of the discs comprises hydraulic means.

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~~36~~. Continuously variable transmission according to claim ~~34~~, wherein the drive of the discs comprises mechanical means.

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~~37~~. Clutch, comprising two clutch plates which can be brought into frictional engagement for transferring a drive couple, said clutch plates being connected to ~~the~~ an input shaft and to an output shaft, comprising an actuator according to any of claims 1-29, said actuator having a hollow screw which accommodates one of the shafts.